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ABSTRACT

Studies were conducted to investigate cue system utilization by three groups of readers--six second graders, six ninth graders, and four adults past the age of sixty who were rated as mature readers. The second graders read materials that varied according to organizational structure, while the other groups read materials that differed in the dimensions of emotion and abstraction. Miscue analysis procedures were used in collecting data from the readers; miscues were coded according to their indication of the readers' use of each of five cue systems. Analysis of the results indicated that readers in all three age groups tended to use the same cue systems in a consistent fashion regardless of the nature of the materials read, that a clear preference for word cues appeared to detract from the use of other cue systems and from reading comprehension, and that the preferences of the mature readers for word cues were neither as strong nor as detrimental to the use of other cue systems as were such preferences among the younger subjects. (GW)

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The Effects of Content-Area Writing Patterns Upon Cue System Utilization by Second-Grade, Ninth-Grade, and Mature Adult Readers

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The variability of the reading process across differing materials merits careful study, since understanding of the nature and degree of such variability has direct impact upon teaching strategies. Although discrete reading processes for differing materials have been proposed (Gibson and Levin, 1975; Robinson, 1975), basic research is warranted to describe the interaction of readers with such materials (MacGinitie, 1975-76).

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This report presents three studies which, taken together, observed a cross-section of readers at three points on the developmental continuum. Similar in terms of design and procedures for data collection and analysis, the studies provide a view of striking similarities in cue system utilization across wide age variations.

Conceptual Overview: Cue Systems in Reading

Reading is the active process of constructing meaning from written language (Goodman, 1967). To this end there are five systems that operate to cue meaning: (1) cue systems within words, (2) cue systems within the flow of language at the sentence level, (3) cue systems within the flow of connected discourse, (4) cue systems within the reader, and (5) cue systems external to both language and the reader (Smith, Goodman, and Meredith, 1970; Neuwirth, 1976; Meyer, 1976).

Cue systems within words include letter-sound relationships, affixes, recurrent spelling patterns, known words within new words, shape or word configurations, and whole known words. Cue systems within the flow of language at the sentence level include common word pattern arrangements, inflection and inflectional agreement, function words such as noun and verb markers, intonation, punctuation, and contextual meaning within the sentence (Smith, Goodman, and Meredith, 1970). Cue systems within the flow of connected discourse include intersentence grammar, semantic redundancy beyond the sentence level, and organizational structures characteristic of narrative and expository materials including literature and disciplines such as social studies and science (Neuwirth, 1976; Meyer, 1976).

Cue systems within the reader are conceivably nonlinguistic and

involve the background of experience which the reader brings to the process and his extant conceptual abilities, scripts, and/or schemata (Pearson and Nicholson, 1976; Anderson, Reynolds, Schallert, and Goetz,1976; Schank, 1972). Smith, Goodman, and Meredith (1970) divide these cues into two major systems: (1) experiential background of the reader, and (2) the reader's conceptual background and ability. Extralinguistic cue systems are less directly involved in the interaction of the reader with written language. This group consists of systems of supplied extraneous cues such as pictures, charts, and graphs which attempt to give substance to descriptive language by helping the reader to evoke concepts and visual images presented in language so that understanding occurs.

Factors Which Affect Cue System Utilization

It should be noted that not all cue systems are applicable at every step of the way, particularly cue systems within the flow of connected discourse and extralinguistic cues, which may or may not be applicable depending upon the nature of the material to be read. Other factors may also affect cue system utilization; although some research has been done in this area, much remains unknown. Barr (1975) and Harste and Burke (1976), however, have suggested that the theoretical focus of reading instruction greatly affects cue utilization and hence reader strategies for dealing with print. This effect was particularly noted for poor readers, with good readers seemingly outgrowing their instructional model. In both reports cue system utilization proved predictable given the type of reading instruction which subjects had received.

Meyer (1976) would include the organizational structures found in

prose as a factor influencing cue system use. Because the organizational structures of materials written in discipline areas are distinctive and different from those found in literary pieces, they may demand varying use of available cue systems. Finally, differences in literary and historical narrative may also be significant to the reader. Literary narrative may be described as more emotive in tone (Wheelwright, 1954) and more abstract (Moffett and Wagner, 1976) than historical narrative; the possible effects of these differences upon the reading process have not as yet been examined in research.

The present studies involved in-depth investigations of cue system utilization by three groups of readers--second-grade students, ninth-grade students, and mature adults past the age of sixty. Second-grade readers read materials which varied according to organizational structure, while ninth-grade and mature adult readers read materials which differed on the dimensions of emotion and abstraction.

Research Design

Samples

Study I Six readers from one second-grade classroom were involved in this study. The teacher was asked to rank order all the children in her classroom in terms of their current reading achievement using whatever criteria she chose. Children who had the same kindergarten and first grade teachers were identified within this ranking and a stratified random sample was drawn, including two children with similar instructional histories from the top, middle, and lower one-third of the ranking.

Study II Six ninth-grade English students who were considered

proficient readers were selected for this study. The teacher was asked to identify and rank-order her top ten readers using any criteria she chose, and the top six were chosen for study. Although it was not possible to precisely reconstruct the instructional histories of these readers, an interview concerning the perceptions of the reading process and the preferred reading strategies of the readers involved showed that they generally shared the same set of views.

Study III Four non-institutionalized persons, aged 62, 64, 65, and 82, who were rated as mature readers (Gray and Rogers, 1956) were selected for this study. Data from an initial interview were examined by a panel familiar with the Gray and Rogers (1956) scale, and this panel determined the reading maturity of the study participants. Since it was not possible to obtain precise instructional histories for these readers, the same interview format employed in Study II was used to collect data concerning perceptions of reading and preferred reading strategies. This data indicated that the four persons who participated in Study III held similar views of reading and tended to prefer similar kinds of strategies. Their views and preferences tended to coincide with those of the six readers in Study II.

Materials

Study I Three selections were chosen for this study, all of which dealt with turtles. The amount of prior knowledge which could be brought to the reading task was therefore constant across the three selections. Stories were analyzed for readability using the Spache formula and were found to be highly similar (Turtle Rescue=2.5 grade level; "Kinds of Turtles"=2.6 grade level; "Clever Turtle"=2.6 grade level). Materials

were selected on the basis of readability and because they represented typical formats found in social studies materials ("Turtle Rescue"), science materials ("Kinds of Turtles"), and literature ("Clever Turtle"). To verify selection choices, copies of all three selections were given to one class of 30 undergraduate students in elementary education and each student was asked to classify each selection according to various disciplines. Student responses were studied for agreement. Eighty-three per cent of the students identified "Turtle Rescue" as a social studies selection, one hundred per cent identified "Kinds of Turtles" as a science selection, and ninety-three percent identified "Clever Turtle" as a literature selection.

Studies II and III Two selections, both about the American Civil War, were selected for Studies II and III; thus, pertinent prior knowledge was held constant for the selections. The Dale-Chall and Flesch readability formulas were used to determine that the selections were comparable in terms of readability. The literary narrative selection ("An Episode of War") was rated as high 8th grade material by the Dale-Chall formula and as 8-9 grade material by the Flesch formula. The historical narrative ("The Years of Southern Success") was rated as 7-9 grade material by the Dale-Chall formula and as 8-9 grade material by the Flesch formula. Both narratives employe a straightforward chronological pattern of organization. Neither provided extralinguistic cues. The significant difference in the narratives was taken to be that the literary selection is relatively more emotive and abstract than the literary selection, which presents a more nonemotive and concrete treatment of specific, identifiable events.

Procedures

Study I Procedures described in the Reading Miscue Inventory (RMI) Manual (Goodman and Burke, 1972) were used in collecting data from each of the six readers. Each reader was told to read each selection and to retell the selection when finished. All readings and retellings were tape recorded for analysis, and each reader was told beforehand of the use of the recorder. The three selections were read by each reader in a single one-hour session, and the order of selection presentation was varied across readers. Reading sessions were conducted by a single researcher in a teacher's lounge located in the school the students attended, and the readers were released from class to attend the sessions. All of the readers indicated that they had enjoyed reading and talking with the researcher.

Study II Data collection procedures for this study are similar to those described for Study I. Since the two selections used in this study are considerably longer than those used in Study I, two reading sessions were held for each reader. In the initial session, the reader was interviewed concerning perceptions of the reading process and preferred reading strategies. Following the interview, the reader read one of the two selections orally and retold it to the researcher. In the second session, the reader read and retold the remaining selection. All readings and retellings were tape recorded for analysis, and readers were told of the use of the recorder. The order of selections read was alternated across readers so that three readers read the literary selection first and the other three read the historical selection first. All reading sessions were conducted in a quiet, well-lighted room free from any

noise or other distractions, and the readers were released from classes to attend the sessions.

Study III The procedures used in this study are identical to those described in Study II, except that all data-collection sessions were conducted by the researcher in the homes of the readers being studied.

Data Analysis

Study I Worksheets for each selection were prepared following procedures as described in the RMI Manual. Standard miscue counting procedures were followed with the exception that partial corrections were counted as miscues and coded as evidence of within-words cue utilization. The first 30 miscues made by a subject (or all miscues when less than 30) on each of the three selections were analyzed. Following this procedure produced 398 miscues for analysis. Twenty-four questions were asked of each miscue.

Miscues were coded in terms of whether or not they indicated the reader's utilization of each of the five cue systems. When there was evidence that cue systems within words had been utilized, the miscue was coded as partial word (showing utilization of letter-sound relationships or affixes) or whole known words (whole words produced in lieu of the expected response, words omitted preceded by a one-second pause, or the production of known words within the text word on which the miscue occurred). Both syntax and semantics were coded within the flow of language at the sentence level, as was intersentence grammar and semantic redundancy at the intersentence or discourse level. The reader's utilization of preferred oral language structures and lexical item preferences was taken as evidence of his bringing his conceptual understanding

of language and the world to the task, and were coded within the category of cue systems within the reader. Extralinguistic cue system use was noted on the worksheet at the time of taping, and coded as pictures and other such cues as charts and graphs.

Ten additional questions coded which of the five cue systems had been used to predict and to confirm meaning. When a miscue was left uncorrected, it was assumed that the same cue systems used to predict had also been used to confirm.

Sentences were read as the reader had read them and coded as to whether miscues resulted in meaning change. Meaning change was coded as Yes, No, or Partial, using decision rules established by Goodman and Burke (1976). The coding sheet used is shown as Figure I.

[Figure 1 here]

Dividing the number of sentences in which meaning was changed by the number of sentences read allowed the calculation of in-process comprehending scores based on the meaningfulness of what the readers produced while reading orally. High scores (.70+) indicate poor comprehending behaviors, while low scores (.30 or less) indicate good comprehending behaviors, or high retention of meaning at the sentence level.

Three additional questions were asked of each miscue: (1) the effectiveness of the initial prediction in the retention of meaning (+ or -); (2) whether the miscue was corrected or not (+ or -); and (3) the effectiveness of the final product in terms of meaning change (+ or -). This procedure resulted in four patterns: ineffective cue utilization (- - -), overcorrection (+ + +), predicted to meaning (+ - +), and corrected to meaning (- + +).

Percentages (proportion of actual cue system utilization and

effectiveness to total possible cue system utilization and effectiveness) were calculated for each of the 24 questions, using the total number of miscues made on the selection as the base unit. This procedure permitted the analysis of miscues at the clause, sentence, and intersentence level and resulted in a minimal loss of information.

In addition to these analyses, one additional calculation was made. This was miscues per hundred words (MPHW), the ratio of miscues made to the total number of words in the selection X 100. This procedure equalizes miscue counts across selections of various lengths.

Cue utilization profiles, MPHW, comprehending scores, ineffective cue utilization patterns, correction-to-meaning patterns, prediction-to-meaning patterns, ineffective cue utilization by comprehending loss scores, cue utilization for predicting and confirming profiles, and miscues to comprehending loss by readers across selections were examined. Differences of .30 were considered significant.

Studies II and III Data analysis procedures were nearly identical for these two studies, and similar to those described for Study I. Reading interview data was examined to establish the readers' conceptions of the reading process and permit comparison of described and actual reading performance on differing materials. All of the oral reading miscues were analyzed for each reader using procedures described in the RMI Manual (Goodman and Burke, 1972). 1,105 miscues were analyzed in Study II, and 268 miscues were analyzed in Study III.

RMI procedures involved asking nine questions of each miscue which resulted in comparing substitutions to the expected response and

evaluating all miscues in terms of correction, syntactic acceptability, semantic acceptability, and meaning change. Codings for these questions permitted additional observations. By examining the coding for a given miscue in the categories of correction, syntactic acceptability, and semantic acceptability, the reader's tendency to preserve grammatical relationships in text could be assessed. Similarly, an assessment of in-process comprehending was made through examination of the codings in the correction, semantic acceptability, and meaning change categories.

Comprehension was also assessed by calculating retelling scores according to the guidelines in the RMI Manual. To equalize miscue counts across selections of different lengths, the number of miscues per hundred words (MPHW) was calculated. Indices of the readers' tendency to recover from miscues which disturb meaning were also constructed in these studies. In Study II, residual miscues per hundred words (RMPHW) - the ratio of miscues which disturb meaning to the total number of words in the selection X 100 - was used as such an index. Study III used the percentage of residual miscue sentences (those sentences in which an uncorrected miscue caused meaning change) as such an index. Finally, in Study II the percentage of regressions made by each reader at the morphemic or sub-morphemic level was calculated in an effort to illustrate the tendency toward the use of cue systems within words.

Results and Discussion

The balance of this report will present those conclusions common to all three of the studies and samples from the data supporting them. Some important implications which arise from these studies will also be noted.

Consistency of Cue System Utilization

Readers in all three studies tended to use the same cue systems in a consistent fashion regardless of the nature of the materials read. Ellen, a second-grade subject in Study I, made extensive and consistent use of the within-words cue system on all three selections, relying much more heavily on whole words than partial words. On "Clever Turtle", the literature selection, 91% of Ellen's miscues involved the use of whole-word cues while 9% reflected the use of partial words. 87% of her miscues on "Turtle Rescue" (social studies) and on "Kinds of Turtles" (science) showed her use of whole word cues, while the proportions of partial word cue utilization were 10% and 7%, respectively. Ellen was also consistent in her rate of miscue production, with a miscues per hundred words (MPHW) rate of 13 on "Turtle Rescue", 16 on "Kinds of Turtles", and 19.8 on "Clever Turtle". Vince, the most consistent user of the various cue systems across the three selections, relied to some degree upon whole word cues in 97% of his miscues on "Kinds of Turtles", and in 93% of his miscues in both of the other selections. Vince produced a similar number of miscues per hundred words (MPHW) on "Kinds of Turtles" and "Clever Turtle" but considerably fewer on "Turtle Rescue". MPHW for these selections were 32, 30, and 16.7, respectively. These two subjects utilized discourse cues, cues within the reader, and extra-linguistic cues much less frequently in the three selections. Ellen's use of picture cues in 10% of her miscues on "Turtle Rescue" represents the greatest use, for both these subjects, of information from these systems.

The pattern of consistent preference for word level cues across

selections also appears in the data from Study II. For Debbie, a ninth-grader in this study, 64% of her substitution miscues on the literary narrative selection were coded as having high phonetic similarity to the text word; 66% of here miscues on the historical narrative were coded in the same category. 67% of her literary narrative substitutions showed high graphic similarity to the test word, while 71% of the substitutions on the historical narrative were equally similar. In addition, most of her regressions for correction attempts occurred at the morphemic and sub-morphemic levels on both selections. 79% of the regressions on the literary selection occurred at these levels, and 80% of the regressions on the historical selection occurred at the same levels. However, only 15 % of her miscues on the literary resulted in fully acceptable syntactic and semantic structures; for the historical selection, the corresponding figure is 32%. For the entire sample, 65% of the substitutions bore high phonetic similarity to the text word on both of the selections. 68% of all substitutions on the the literary selection were coded as having high graphic similarity to the text word; the corresponding figure for th other selection is 69%. 62% of all regressions on the literary selection occurred at the morphemic and sub-morphemic levels; 67%of all regressions occurred at these levels on the historical selection. Only 26% of all miscues on the literary selection resulted in fully acceptable syntactic and semantic structures, and 40% of all miscues generated on the historical selection were so coded. Finally, the rate of miscue occurrence (MPHW) was similar for both selections - 15.12 and 13.47, respectively.

Study III produced similar results from the same selections used

in Study II. 50% of Blanche's substitution miscues (from Study III) on both of the selections were highly similar to the text word in terms of both graphics and sound. Her rate of miscues per hundred words (MPHW), while far lower than that of subjects in Study II, was consistent across selections: 1.6 for the literary narrative and 2.1 for the historical narrative. All of the subjects in Study III produced a relatively high percentage of miscues on both selections (65%+) that were fully acceptable syntactically and semantically. This would indicate that while the older subjects were very consistent in cue system use across differing materials, their preferences for word cues were neither as strong nor as detrimental to the use of other cue systems as were such preferences among younger subjects.

Clear preference for word cues across samples and selections did appear to influence both the use of cues from other systems and comprehending effectiveness in all three studies. In the preceding data, it can be seen that the use of the word-level cue system is inversely related to the use of other available cue systems. The degree of preference for cues within words also seems to be inversely related to comprehending effectiveness.

Strong preference for cues within words on the part of Ellen and Vince (Study I) was accompanied by high incidence of meaning change resulting from miscues. 89% of Ellen's miscues on "Turtle Rescue" caused a change in meaning as did 72% of her miscues on "Kinds of Turtles" and 54% of her miscues on "Clever Turtle". For Vince, meaning change resulted from 91% of his "Turtle Rescue" miscues, 85% of those generated on "Kinds of Turtles", and 90% of the ones he produced on "Clever Turtle".

Debbie, a subject from Study II whose consistent preferences for cues within words were described previously, was also a relatively poor comprehender of the two selections she read. 68% of her literary selection miscues produced meaning change, as did 45% of her miscues on the historical selection. Her residual miscues per hundred words (RMPHW), indicating the frequency of uncorrected miscues that disrupt meaning, were 10.85 for the literary selection and 7.28 for the historical selection. Her retelling scores were 12 and 2, respectively. For the entire sample, 63% and 45% of the miscues on the respective selections produced meaning change, and the mean retelling scores were 19 and 10.

Blanche, whose word cue preferences (Study III) were not as strong as those shown by younger readers, may have fared better as a comprehender of the two selections. This is indicated by the low percentage of sentences on both selections in which she produced meaning - disturbing miscues. Only 2% of the sentences from the literary selection; and 9% of the sentences from the historical selection caused Blanche to produce miscues that changed meaning. However, her retelling scores were quite low on both selections - 19 and 5.5, respectively.

It should be noted that not all subjects in the three studies demonstrated an equally strong overreliance upon cues within words. The greatest variation in preferences was seen in Study I, where subjects who were rated as relatively proficient readers tended to be both more flexible in cue system use and better comprehenders. These readers did, however, demonstrate consistency in their patterns of cue system utilization.

Importance of the reader's view of the process

Differences among materials read in these studies appeared to produce only minor differences for individual subjects in the use of various cue systems. Indeed, all subjects' reading performances tended to reflect their concepts of the nature of the reading process more clearly than the differences in materials. Vince and Ellen seemed to consistently view reading as a word-centered process regardless of the material they were reading, while other, more flexible readers in Study I were characterized by their strong and consistent reliance upon sentence and discourse level syntax and semantics, and their conceptual and linguistic backgrounds. The interview data collected in Study II revealed that all subjects in that sample, like Vince and Ellen, tended to view reading as a process of accurate word recognition, and the oral reading data from this sample which was previously discussed indicates that reading performances were consistent, across both selections, with these stated perceptions of reading. Interviews among the older subjects of Study III revealed a significant concern for accuracy of word recognition, which was also apparent in their oral reading performances on the two selections. The reader's view of the process therefore seems to determine patterns of cue system use to a much greater extent than the differences among materials from various content areas.

Implications

Data from these studies suggest that the reading process is relatively stable across content areas, and that the widely held notion of significant differences in the demands made by content materials (Piercey,

1976; Robinson, 1975; Gibson and Levin, 1975; Herber, 1970) needs reexamination. Further, since subjects in these studies produced evidence of attending to multiple sources of information simultaneously, their behavior fails to support "bottom-up" models such as Gough's (1972) and suggests that Geyer and Kolers' (1974) explanation of reading as a minimal-cue-impletion process is more reasonable. Further, the notion of automatic decoding as pre-requisite to meaning (Samuels, 1976) is not supported by this data. All subjects in these studies generated miscues, and the numbers of miscues produced, or MPHW, had little relationship to comprehending scores. However, strong concern for accurate decoding was related to poor comprehending, even among the high-school subjects and those past the age of sixty.

Whether or not the preference for attending to cues within words at the expense of meaning is an artifact of instruction is an important question that merits further study. The present studies, however, seem to clearly indicate a need for instruction which encourages readers to apply their knowledge of language and of the world in making greater use of all available cue systems, and avoiding overreliance upon those cues which, inflexibly used, lead to poor comprehension.

Reading Selections

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Figure 1
Coding Sheet for Study I

Reader's Name and Story

Sentence No.	No. of Miscues in Sentence	Miscue Number	TEXT	READER	WORD CUES (1)		SENTENCE CUES (2)		DISCOURSE CUES (3)		READER CUES (4)		EXTRA-LINGUISTIC (5)		CUE SYSTEMS USED FOR PREDICTING					CUE SYSTEMS USED FOR CONFIRMING					COMPREHENDING (MEANING CHANGE)			Effectiveness of Prediction	Correction	Effectiveness of End Product
					Partial Word	Whole Word	Syntax	Semantics	Intersent. Syntax	Intersent. Semantics	Lng Bkgd	Conceptual Bdgd	Pictures	Graphes Charts, etc.	1	2	3	4	5	1	2	3	4	5	No	Minimal	Yes			
			a. Total Miscues _____ b. Words Read in Selection _____ a/b x 100 = Miscues Per 100 wds _____																											

Ineffective Cue Utilization ____
Overcorrections ____
Correction to Meaning ____
Predicted to Meaning ____

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